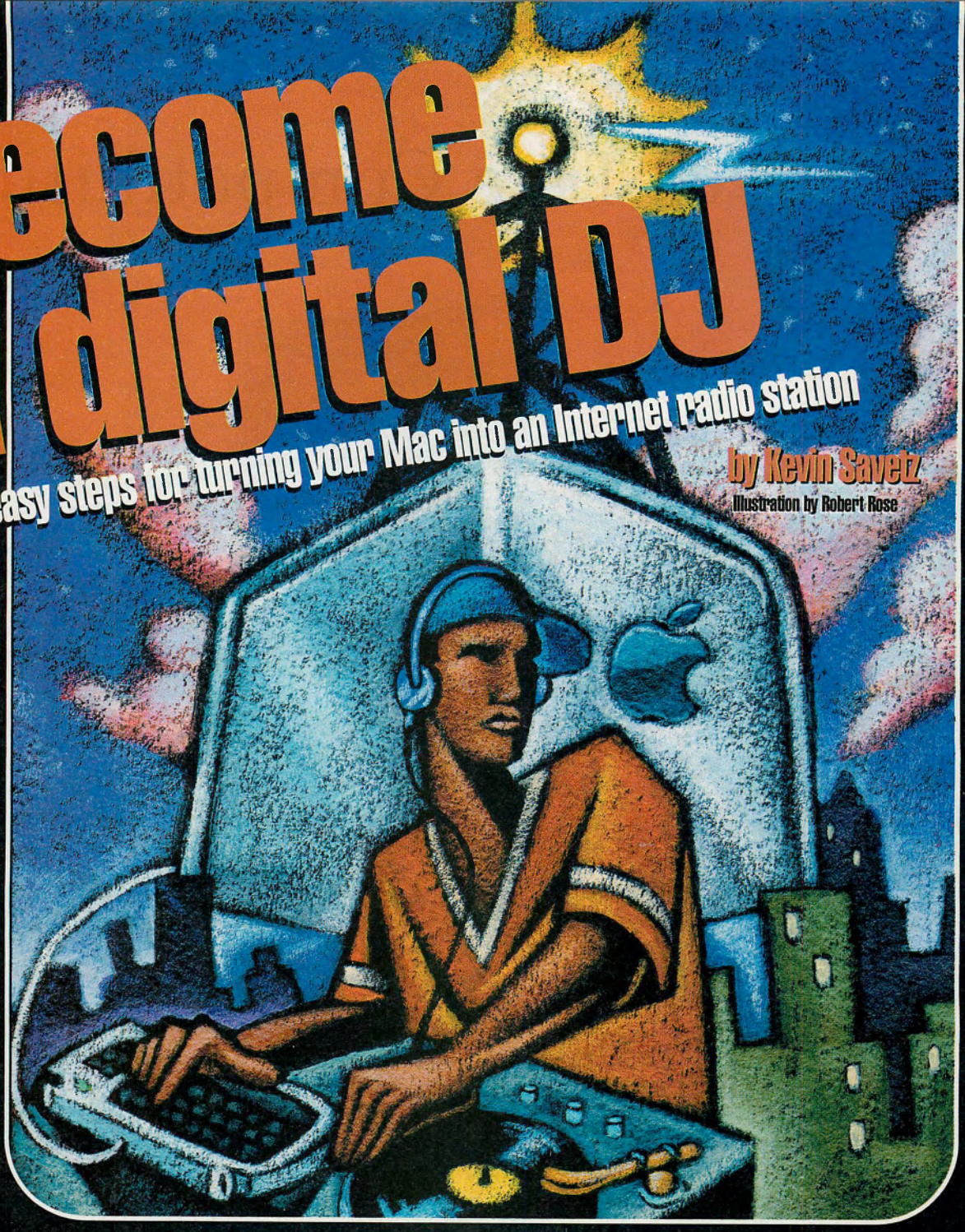
become a digital DJ

5 easy steps for turning your Mac into an Internet radio station

by Kevin Savetz

Illustration by Robert Rose



Find Audion 1.5, MACAST 1.0r2, N2MP3-1.5b3, SoundJam MP Free 2.1.1, and iStream 1.4.1 on The Disc.

Share your music with the *MacAddict* masses at www.macaddict.com/debate.

Back in the day, it seemed as if most children harbored dreams of becoming firefighters, teachers, or Luke Skywalker. But we had more noble aspirations: We wanted to share music with the masses. Luckily, it no longer takes a 100,000-watt transmitter and an FCC license to roll your own radio station—just a Mac and a moderately fast Internet connection. Here we show you, in five simple steps, how to get your own radio station up and running on your Mac using the shareware iStream. iStream will only stream premade MP3 playlists, so you can't do live streaming (although the makers of iStream are leaving that possibility open for the future). However, the software does allow just about anyone on the Internet to tune in—even PC users. That is, if you let them.

The Scoop on iStream

Price: 10-listener license, free
30-listener license, $15
60-listener license, $29.99

System Requirements:
100MHz or faster PowerPC
Mac OS 8.1 or later
Internet connection (56-Kbps or faster)

(Make sure to register the program from the Mac you intend to use as a server—once you register, that copy of iStream won't run on any other Mac.)

Step 1: Finding Music

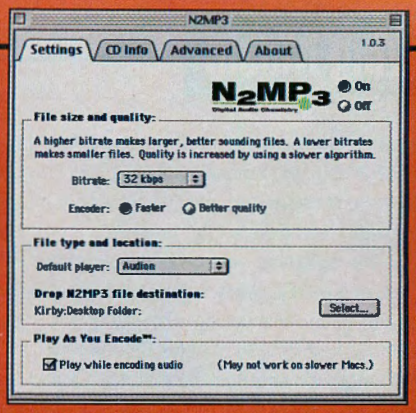
The first thing you'll need before you can start broadcasting to the world is a collection of MP3 files. There are three ways to acquire MP3s.

Method 1: Dig into Your CD Collection

Extracting songs from a CD is called *ripping*, and turning them into MP3 files is called *encoding*. Although technically they're two separate processes, every program we've seen does both in one fell swoop. In the wide spectrum of MP3 rippers and encoders, the differences include ease of use, cost, and the sound quality of created files. Here are some of the best choices: N2MP3 (www.n2mp3.com, $34.95), SoundJam MP (www.soundjam.com, $39.95), MusicMatch (www.musicmatch.com, free), and BladeEnc (www.helsinki.fi/~pkamppur, free).

Method 2: Find It on the Internet

You can find music files at Web sites like MP3.com (www.mp3.com), Lycos MP3 Search (http://mp3.lycos.com), and MP3box (http://mp3.box.sk). Although we don't *advocate* illegal downloading of copyrighted music, we would be remiss not to mention Napster, the most popular way to get MP3s (though the service could shut down by the time you read this). There's no official Mac version, but you can download MP3s from Napster servers via Macster (www.macster.com).

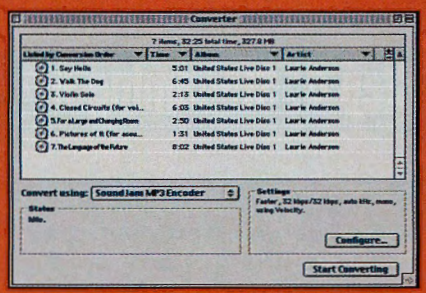


N2MP3 offers drag-and-drop encoding and the ability to listen to music as it encodes.

Method 3: Do It Yourself

You can also stream MP3 files of your friend's garage band, a recitation of Robert Frost, or ambient sounds from underneath your house. Just plug a mike into your Mac's audio-in port, then use the latest version of SoundJam and its Record From Sound Input tool (under the Tools menu). Creating the music yourself is the best way to provide unique content and avoid landing in court (see "But Is It Legal?", p38).

SoundJam MP offers robust encoding and an easy way to downsample high-quality MP3s.



Step 2: Balancing Bandwidth and Bit Rate

Before you invite the world to tune in, you'll need to encode your MP3 files properly. Bit rate determines the amount of information that gets stuffed into the MP3 file. A higher bit rate means better-sounding music but much larger files. You'll have to do a little experimenting to find a rate that balances sound quality with the amount of bandwidth you can spare. Generally, a 56-Kbps modem can effectively serve only one listener at a time, while a 512-Kbps cable modem connection can serve up to eight or nine.

A popular bit rate for MP3 music is 128 Kbps because it produces CD-quality sound. But unless you (and your listeners) have tons of bandwidth to burn, 128 Kbps is too much data to stream to an audience. Michael Juarez, an iStream developer, suggests that the streaming Mac have an Internet connection of at least double the MP3 stream's bandwidth, times the number of simultaneous listeners. Say what? In real numbers, that means you can host a 56-Kbps MP3 stream with five listeners over a 560-Kbps connection—about the equivalent of DSL or cable modem (see "Bandwidth Tricks," below).

The other side of the coin is sound quality: A lower bit rate takes up less bandwidth, but it also degrades the sound by limiting tonal range and adding sound artifacts. According to Juarez, a reasonable lower limit for streaming audio is 56 Kbps for stereo, 32 for monaural.

Finally, make sure you encode all of the files you're streaming at the same bit rate—don't mix 32-Kbps and 64-Kbps files. Why? Some streaming MP3 players (such as WinAmp) assume that the bit rate of the MP3 stream never changes. If you encode the first song at 64 Kbps and the second at 128 Kbps, the latter will sound as if Alvin and the Chipmunks had recorded it. If the second song has a rate of 32 Kbps, it will play too slowly.

Bandwidth Tricks

This chart tells you how many listeners your Internet connection will support (this depends on transmit speed, not receive speed). The "Simultaneous Listeners" numbers are conservative—you may be able to squeeze in a few extra listeners at faster speeds.

MP3 BIT RATE	CONNECTION SPEED	SIMULTANEOUS LISTENERS
32 Kbps	modem (56 Kbps)	1
	ISDN (128 Kbps)	2
	ADSL or cable (512 Kbps)	8
	T1 (1,544 Kbps)	24
48 Kbps	modem (56 Kbps)	0
	ISDN (128 Kbps)	1
	ADSL or cable (512 Kbps)	5
	T1 (1,544 Kbps)	16
64 Kbps	modem (56 Kbps)	0
	ISDN (128 Kbps)	1
	ADSL or cable (512 Kbps)	4
	T1 (1,544 Kbps)	12
128 Kbps	modem (56 Kbps)	0
	ISDN (128 Kbps)	0
	ADSL or cable (512 Kbps)	2
	T1 (1,544 Kbps)	6

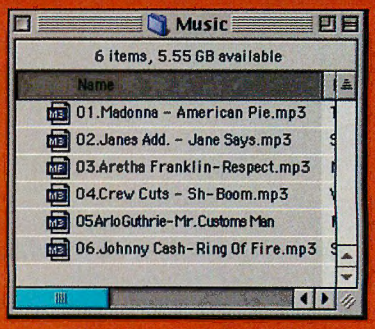
TIP If your connection isn't fast enough to serve the multitudes, try iStream Satellite (www.arcticsw.com/products/istream, free). This *reflector* program downloads your server stream and retransmits it on a faster connection. Run iStream on your home Mac and install Satellite on a machine with a fast hookup (say, your work Mac). Satellite will receive the MP3 stream from your home Mac, and the hordes will point their clients to Satellite—hogging your company's bandwidth, not yours.

Step 3: Storing and Organizing Music

You need to store all of your MP3 files in the Music folder within the iStream folder. iStream plays music in alphabetical order based on file names, so name the MP3 files in the Music folder carefully to determine the songs' playing order—you can start each name with a number. (Don't bother with subfolders, as the program will not dig into them in search of more music.) After the program finishes the last song in the playlist, it will start over with the first file.

Juarez suggests that you "act like a radio station" when it comes to storing and organizing music. "Start making routine schedules, and keep music on archival CD-ROMs. If you have Mambo Monday, you easily know what music you will need from a CD," he says.

The registered version of the program includes a playlist manager, which theoretically allows you to change the order of your songs without resorting to creative file naming (although we should note that the playlist function did not work for us—see "Shareware Woes," p39). Sadly, the program doesn't have a random shuffle mode.

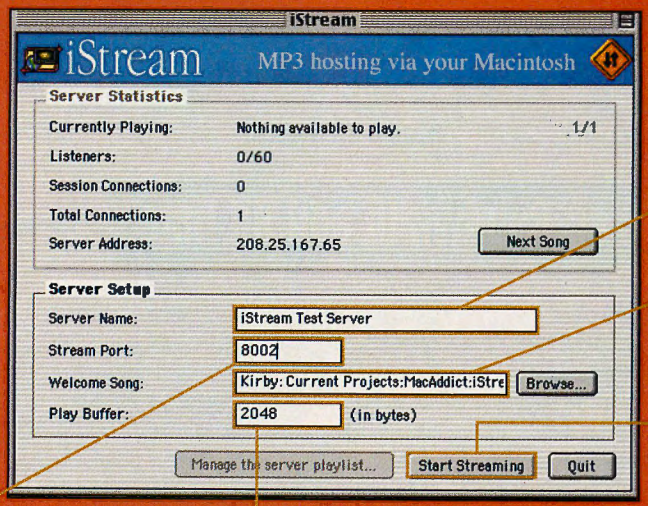


MP3 songs will play in the order in which they appear in the Finder's Name view, so name them carefully—start with a number to get them in the right sequence.

Step 4: Streaming It!

Now it's time for iStream to do its stuff. The first thing you need to do after launching the program is give your fledgling radio station a name—if we catch you using the default name, iStream Test Server, you will be punished accordingly. Next, you should create a Welcome Song. When listeners connect to your music server, they first hear the Welcome Song before getting dumped into the music stream. You don't need to use a song at all: The Welcome Song can be a smarmy radio-style identification, beat poetry, whatever you want.

Finally, you need to plug your settings into the Server Setup section of the main iStream window—see the guide at right.



Your radio station's name. Okay, so punish us.

The folder in which your Welcome Song is located.

On the air! Press the Start Streaming button and let the broadcast commence. If you get an error message, make sure you have pointed iStream to a Welcome Song. Then press Next Song, Start Streaming. This takes care of a number of problems.

Any number above 8,001. MP3 stream ports are usually on ports 8,001 and above—it doesn't really matter what port number you use as long as no other server on your Mac is using the same one.

A number that works well with your modem speed. The Play Buffer field controls the size of the MP3 data packets iStream sends. The default setting of 2,048 should work in most situations. However, if you have more bandwidth, you may want to bump up the buffer setting. Use the guidelines at right.

CONNECTION	BUFFER (IN BYTES)
14.4	512
28.8	1,024
56.6	2,048
64 ISDN	4,096
128 ISDN	8,192
Cable	16,384
T1	32,768
T3+	65,536

But Is It Legal?

So you're eager to set up an online radio station, but you're also wondering whether it's entirely legal. U.S. copyright law allows ripping CDs for your own use, but streaming them on the Internet for others to enjoy is a more complicated legal situation.

It is perfectly acceptable to stream music on the Internet in many situations. Examples of legal streaming include these situations: your own band wrote and performed the tune, the recording is in the public domain (this is very rare, according to the public domain music site www.pdinfo.com), or you licensed the music from the copyright holder. But simply ripping your favorite Zeppelin tunes from CD, then streaming them online, is an "unauthorized performance" that might earn you an angry cease-and-desist letter.

Streaming copyrighted music creates "problems on two fronts," says Terry Carroll, an attorney specializing in intellectual property law: "For the musical work (the song itself), this is deemed to be a public performance. In the absence of a license, it would likely be considered copyright infringement." The other issue is the digital aspect: Unlicensed digital performance of a recording may mean an additional infringement of the owner's rights and constitute another penalty.

Step 5: Tuning In

Your listeners don't have to be Mac users: There are streaming MP3 clients for Windows (including UltraPlayer MP3 and WinAMP), Linux (FreeAMP and Xaudio), and other operating systems. Just tell your listeners to connect to your Server Address: Stream Port using the Open URL function in their MP3 player (the main iStream window lists both the server address and the port). When people log on to the iStream server, they'll hear the Welcome Song; then they'll pick up from wherever the stream happens to be. If two people log on at two different times, they'll hear the same music.

Remember, iStream is simply a server—it transmits music but doesn't play it. To listen to your own radio station, you'll need a client that can play MP3 streams—choices include SoundJam, MACAST (www.macast.net), and Audion (www.panic.com/audion). You can use one of these programs on the server to listen to your own stream without taking up any bandwidth. To do so, tell your MP3 player to tune in to the Server Address:Stream Port.

In the Server Statistics section of the main iStream window, you'll see basic listener data, including the number of current listeners and the total number of connections the server has seen since you installed the software (or since you threw away the Preference file). However, don't expect Arctic Software to help you get the word out on your radio station. To acquire listeners, you have to tell folks to tune in. Just make sure you have the bandwidth to support the teeming masses sure to demand entrance to your very own Internet radio station.

Even your Windows-lovin' friends can tune into your iStream station. Here, a WinAMP user enjoys the sounds of Johnny Cash.

Streaming Caveats

You may encounter a couple of problems when it comes to running a streaming server at home.

* **Dynamic IP Addresses**—If you get your IP address through DHCP (or some other dynamic method), your server's IP address will likely change within a few days—or even a few hours. To fix this, you'll need to get a static IP address from your ISP, which typically costs a little extra. If you don't nail down a static IP address, your server's address will change periodically, and you'll have to keep your listeners up to date on that changing number.

* **Firewalls**—If your server lies behind a firewall—either a home version or a larger, industrial-strength one at the workplace—you'll have to punch a hole in that firewall for the IP address and port number where you've located your server. If your firewall is a home type, you can do it yourself; if the IT staff at work runs the firewall, you'll have to ask them to punch the hole for you. Otherwise, only people within the firewall can listen to your station.

Shareware Woes: 5 Problems to Watch Out For

If iStream was a radio station, it wouldn't be a hip, megacorporate station. It would be the funky pirate radio station running out of a van. As the owner, DJ, and programming director of such a station, you can expect to experience problems from time to time, because the program has bugs. You'll just have to work around them. Here's a rundown of the glitches you may encounter (although by the time you read this, Arctic Software might fix some of these).

1. The program crashes if you don't choose a Welcome Song and press the Next Song button before starting the stream.

2. You must press the Start Streaming button to activate your station—there's no way to activate the stream automatically when you run the program.

3. Because of the program's cryptic error messages, you may have to consult the troubleshooting section of iStream's documentation quite often.

4. Although we dutifully paid the shareware fee, we had difficulty convincing iStream to accept the registration code—every time we started up, the program continued to berate us for not paying.

5. Registering is supposed to activate the playlist management feature (which lets you alter the song order without renaming files), but according to Arctic Software, iStream won't activate this feature until you upgrade to version 2.0 (not released as of press time).

Get used to this screen, which appears every time you run iStream—even after you've paid up.

This playlist window, which should allow you to change the song order without renaming files, didn't work for us. The developers have promised a fix in iStream 2.0.

Kevin Savetz (savetz@northcoast.com) is a freelance computer technology writer in Northern California. Kevin used to work at a local radio station, where he decided to air the uncensored versions of the foulest-mouthed rap music he could find. He no longer works there.